

## **No. 2 Recovery Furnace Maximum Emissions**

Maximum production = 1,129 TBLS/day

NCASI Conversion factor = 3,500 lb BLS/ADTP

$1,129 \text{ TBLS/day} \times 1 \text{ day/24 hr} \times 2,000 \text{ lb/1 ton} \times 1 \text{ ADTP/3,500 lb BLS} = 26.88 \text{ ADTP/hr}$

Flow rate from March 31, 2010 compliance test = 114,000 dscf/min @ 7.1% O<sub>2</sub>

Production during March 31, 2010 stack test = 26.76 ADTP/hr

Flow rate at maximum production =  $114,000 \times 26.88 \div 26.76 = 114,500 \text{ dscf/min}$

## **Particulate Matter (PM)**

MACT Emission limit = 0.044 gr/dscf @ 8% O<sub>2</sub>

$0.044 \text{ gr/dscf} \times (20.9 - 7.1) / (20.9 - 8) = 0.047 \text{ gr/dscf}$

$0.047 \text{ gr/dscf} \times 114,500 \text{ dscf/min} \times 60 \text{ min/hr} \times 1 \text{ lb/7,000 gr} = 46.13 \text{ lb/hr}$

$46.13 \text{ lb/hr} \times 8,760 \text{ hr/yr} \times 1 \text{ ton/2,000 lb} = 202 \text{ tons/yr}$

## **Total Reduced Sulfur (TRS as H<sub>2</sub>S)**

State Allowable emission limit = 20 ppm @ 8% O<sub>2</sub>

$20 \text{ ppm} \times (20.9 - 7.1) / (20.9 - 8) = 21.4 \text{ ppm}$

$21.4 \text{ ppm} \times 34/385.3 \text{E6} \times 114,500 \text{ dscf/min} \times 60 \text{ min/hr} = 13.0 \text{ lb/hr}$

$13.0 \text{ lb/hr} \times 8,760 \text{ hr/yr} \times 1 \text{ ton/2,000 lb} = 56.9 \text{ tons/yr}$

## **No. 3 Recovery Furnace Maximum Total Reduced Sulfur (TRS as H<sub>2</sub>S) Emissions**

Maximum production = 2,040 TBLS/day

Flow rate from December 2, 2003 compliance test = 183,000 dscf/min @ 5.5% O<sub>2</sub>

Production during December 2, 2003 stack test = 73.5 TBLS/hr = 1,764 TBLS/day

Flow rate at maximum production =  $183,000 \times 2,040 \div 1,764 = 211,600 \text{ dscf/min}$

BACT/NSPS emission limit = 5 ppm @ 8% O<sub>2</sub>

$5 \text{ ppm} \times (20.9 - 5.5) / (20.9 - 8) = 5.969 \text{ ppm}$

$5.969 \text{ ppm} \times 34/385.3 \text{E6} \times 211,600 \text{ dscf/min} \times 60 \text{ min/hr} = 6.69 \text{ lb/hr}$

$6.69 \text{ lb/hr} \times 8,760 \text{ hr/yr} \times 1 \text{ ton/2,000 lb} = 29.3 \text{ tons/yr}$

**No. 2 Lime Kiln Maximum Nitrogen Oxide (NO<sub>x</sub>) Emissions**

2001 PSD BACT emission limit = 152 ppm @ 10% O<sub>2</sub>

Flow rate from October 22, 1999 stack test (PM) = 21,900 dscf/min @ 2.7% O<sub>2</sub>

Production rate during October 22, 1999 stack test (PM) = 340 tons CaO/day

Flow rate at maximum production = 21,900 dscf/min × 465 tons CaO/day ÷ 340 tons CaO/day  
= 30,000 dscf/min

152 ppm × (20.9 – 2.7) / (20.9 – 10) = 254 ppm

254 ppm × 46/385.3E6 × 30,000 dscf/min × 60 min/hr = 54.5 lb/hr

54.5 lb/hr × 8,760 hr/yr × 1 ton/2,000 lb = 239 tons/yr

**Fresh Lime Silo and Reburn Lime Silo Particulate Matter (PM) Emissions**

Emission factor from 1994 permit application = 0.02 gr/acf

Flow rate from 1994 permit application = 3,835 acfm

0.02 gr/acf × 3,835 acf/min × 60 min/hr × 1 lb/7,000 gr = 0.66 lb/hr maximum

Assume actual = 0.5 × maximum = 0.5 × 0.66 = 0.33 lb/hr actual

### **No. 3 Recovery Furnace Emission Factors (2005 PSD/NSR Permit)**

#### **Particulate Matter (PM)**

NCASI TB 884 emission factors = 0.37 lb/TBLS (filterable)

*= 0.063 lb/TBLS (condensable)*

December 2, 2003 compliance test =  $29.4 \text{ lb/hr} \times \text{hr}/73.5 \text{ TBLS} = 0.40 \text{ lb/TBLS}$  (filterable)

August 4, 2004 compliance test =  $23 \text{ lb/hr} \times \text{hr}/68 \text{ TBLS} = 0.34 \text{ lb/TBLS}$  (filterable)

February 15, 2005 engineering test =  $48.7 \text{ lb/hr} \times \text{hr}/66.3 \text{ TBLS} = 0.73 \text{ lb/TBLS}$  (filterable)

February 16, 2005 engineering test =  $45.4 \text{ lb/hr} \times \text{hr}/69.7 \text{ TBLS} = 0.65 \text{ lb/TBLS}$  (filterable)

Average test value =  $[0.40 + 0.34 + 0.73 + 0.65] \div 4 = 0.53 \text{ lb/TBLS}$  (filterable)

#### **Sulfur Dioxide (SO<sub>2</sub>)**

NCASI TB 884 emission factor = *0.22 lb/TBLS*

December 2, 2003 compliance test =  $17.7 \text{ lb/hr} \times \text{hr}/73.5 \text{ TBLS} = 0.24 \text{ lb/TBLS}$

August 4, 2004 compliance test =  $2.1 \text{ lb/hr} \times \text{hr}/68 \text{ TBLS} = 0.031 \text{ lb/TBLS}$

Average test value =  $[0.24 + 0.031] \div 2 = 0.14 \text{ lb/TBLS}$

#### **Nitrogen Oxide (NO<sub>x</sub>)**

NCASI TB 884 emission factor = *1.50 lb/TBLS*

December 2, 2003 compliance test =  $108.5 \text{ lb/hr} \times \text{hr}/73.5 \text{ TBLS} = 1.48 \text{ lb/TBLS}$

August 4, 2004 compliance test =  $86.7 \text{ lb/hr} \times \text{hr}/68 \text{ TBLS} = 1.28 \text{ lb/TBLS}$

Average test value =  $[1.48 + 1.28] \div 2 = 1.38 \text{ lb/TBLS}$

#### **Carbon Monoxide (CO)**

NCASI TB 884 emission factor = 1.21 lb/TBLS

December 2, 2003 compliance test =  $65.2 \text{ lb/hr} \times \text{hr}/73.5 \text{ TBLS} = 0.89 \text{ lb/TBLS}$

August 4, 2004 compliance test =  $109 \text{ lb/hr} \times \text{hr}/68 \text{ TBLS} = 1.60 \text{ lb/TBLS}$

Average test value =  $[0.89 + 1.60] \div 2 = 1.25 \text{ lb/TBLS}$

## **No. 2 Lime Kiln Emission Factors (2005 PSD/NSR Permit)**

### Particulate Matter (PM)

NCASI TB 884 emission factor = 0.089 lb/ton CaO (filterable)

*= 0.188 lb/ton CaO (condensable)*

December 2, 2003 compliance test =  $2.1 \text{ lb/hr} \times \text{hr}/17 \text{ ton CaO} = 0.12 \text{ lb/ton CaO (filterable)}$

August 4, 2004 compliance test =  $2.1 \text{ lb/hr} \times \text{hr}/16.6 \text{ ton CaO} = 0.13 \text{ lb/ton CaO (filterable)}$

Average test value =  $[0.12 + 0.13] \div 2 = 0.125 \text{ lb/ton CaO (filterable)}$

### Sulfur Dioxide (SO<sub>2</sub>)

NCASI TB 884 emission factor = *0.33 lb/ton CaO*

December 2, 2003 compliance test =  $0.33 \text{ lb/hr} \times \text{hr}/17 \text{ ton CaO} = 0.019 \text{ lb/ton CaO}$

August 4, 2004 compliance test =  $0.28 \text{ lb/hr} \times \text{hr}/16.6 \text{ ton CaO} = 0.017 \text{ lb/ton CaO}$

Average test value =  $[0.019 + 0.017] \div 2 = 0.018 \text{ lb/ton CaO}$

### Nitrogen Oxide (NO<sub>x</sub>)

NCASI TB 884 emission factor = 1.15 lb/ton CaO

December 2, 2003 compliance test =  $47.1 \text{ lb/hr} \times \text{hr}/17 \text{ ton CaO} = 2.77 \text{ lb/ton CaO}$

August 4, 2004 compliance test =  $24.4 \text{ lb/hr} \times \text{hr}/16.6 \text{ ton CaO} = 1.47 \text{ lb/ton CaO}$

Average test value =  $[2.77 + 1.47] \div 2 = 2.12 \text{ lb/ton CaO}$

### Carbon Monoxide (CO)

NCASI TB 884 emission factor = 0.055 lb/ton CaO

December 2, 2003 compliance test =  $2.8 \text{ lb/hr} \times \text{hr}/17 \text{ ton CaO} = 0.165 \text{ lb/ton CaO}$

August 4, 2004 compliance test =  $1.5 \text{ lb/hr} \times \text{hr}/16.6 \text{ ton CaO} = 0.090 \text{ lb/ton CaO}$

Average test value =  $[0.165 + 0.090] \div 2 = 0.128 \text{ lb/ton CaO}$